

very slightly so; carotids (right somewhat more than left) and subclavian violently, expansilely, visibly beating, widening base of neck at each ventricular systole; an artery, about size of radial, running vertically along right vertebral groove from posterior base of neck, visibly pulsatile; about inferior angle of left scapula arteries, visibly and locomotively pulsatile, tortuous, in the main vertical; also pulsation found horizontally in several places in the course of the ribs; two spots about inferior angles of scapulæ where heaving expansile impulse.

It must be evident from these data, that in any given case in which a suspicion may arise as to the existence of a constriction of the thoracic aorta, whether congenital or acquired, the presence of some of the abnormal pulsations above described, with or without unusual feebleness of pulsation of the femoral arteries, ought to be sought for. If found, they constitute, probably, certain—and the only certain—proof that the suspicion is well-founded; and the diagnosis in such case might be considered as established.

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ART. III.—*On the Insusceptibility of Pigeons to the Toxic Action of Opium.* By S. WEIR MITCHELL, M. D., Member of the National Academy of Sciences.

DURING September of the present year it became desirable, in the prosecution of a certain research, to cause profound sleep in pigeons. For this purpose I injected under the wing half a grain of sulphate of morphia, dissolved in water. Returning to my laboratory in a few hours, I found the bird unaffected. I then injected the groin of a second pigeon with forty drops of black-drop (acetum opii), and in ten minutes gave by the mouth, through a tube, fifty-five drops. At the same time, a third pigeon took sixty drops of black-drop inwardly, and at the tenth minute received in one groin forty-five drops, and at the fifteenth minute, in the other groin, an equal amount. The latter bird soon became very awkward in its movements; but as this was possibly due to the irritation caused by the injections of the groins, I was not sure that, either in this or the companion case, I could perceive a single unmistakable sign of opium poisoning. Astounded at an immunity apparently so perfect, I endeavoured, a few days later, to discover what amount of opium was needed to kill, and obtained the following results: Pigeon took eighty drops of black-drop internally; no effect except a tendency to keep quiet; no signs of stupour; no change of pupils; feathers ruffled, as is common with these birds when sick from any cause. Pigeon received forty-two minims of black drop under skin of groin. Symptoms the same as in last case. Neither of them slept at all, and both were well the next day. Pigeon received under skin, in

three localities, in all, two grains of sulphate of morphia, dissolved in water slightly acidulated with acetic acid. No effects were seen other than those described in the former cases. Pigeon took, internally, three grains of sulphate of morphia, dissolved; recovery without notable symptoms. Pigeon took, at 8.30 A. M., two hundred and seventy-two drops of black drop. He retained it during an hour, but at 12 was found to have vomited an unknown amount of it, by estimate at least half; recovered after remaining all day quiet in the corner of his cage; not asleep, and capable of being easily roused, and then able to execute every usual movement, as flying, walking, and the like. The final experiment seems to me decisive. To a large pigeon, which, within the two preceding days, had swallowed forty-two drops of black-drop, I gave, between two P. M. and six o'clock, *twenty-one* grains of powdered opium in soft pills of three grains each. Except the usual tendency to remain quiet, none of the common evidences of opium poisoning appeared, and the pigeon was well and active the next day.

After proof so decisive of the difficulty, I am tempted to say, the impossibility of causing death from opium or morphia, it is needless to add to the above experiments. Most poisons affect the pigeon readily enough, but so far as I am aware, no other creature is thus protected from the power of opium. The difficulty of influencing rabbits by belladonna and its derivative atropia is well known, and the dog is also far less susceptible to the effects of the latter drug than is man. Thus I have seen a dog recover after taking twenty-one grains of atropia; but he had in the interval violent convulsions. The case of the pigeon seems to stand quite alone in the absence of symptoms, and in the amount of a poison which it can bear unharmed. The explanation of the cause of this escape would in all likelihood enlighten us as to the true mode in which opium acts upon the creatures which are apt to feel its peculiar powers; but whether we shall ever attain to a knowledge of the reason for these strange insusceptibilities is somewhat doubtful. The most remarkable of them all is the failure of serpent venom to injure its maker or other poisonous snake, and I never have been able to obtain the faintest clue to the cause of the protection, although I have industriously examined the matter in every conceivable way.

It appears to me quite unlikely that the facts related in this paper can have escaped previous notice; but as they are certainly not commonly known, and may be altogether new to toxicology, I have thought it worth while to put them on record, hoping to study them more fully at a future period.